

Claims

1. A method for attenuating the low-frequency noise generated at the outlet (18) of an exhaust line (14), wherein it comprises the steps of:
 - defining a signal (Δf_b) representing the noise to be attenuated,
 - emitting a first high-frequency sound wave (F1) from a first transducer (22) into an attenuation zone (26) of the exhaust line (14), which first high-frequency sound wave (F1) is inaudible and has a carrier frequency of higher than 50 kHz, and
 - emitting a second high-frequency sound wave ($F1 + \Delta f_{cb}$) from a second transducer (24) into the attenuation zone (26) of the exhaust line, the first and second transducers (22, 24) being configured for generating interference between the first and second sound waves in the attenuation zone (26), which second sound wave is inaudible and has as its carrier frequency the carrier frequency of the first high-frequency sound wave (F1) and contains a low-frequency counter-noise signal (Δf_{cb}), which is in opposition of phase to the signal (Δf_b) representing the noise to be attenuated.
2. The method as claimed in claim 1, wherein the frequency of the counter-noise signal is between 10 and 1,000 Hz.
3. The method as claimed in either claim 1 or claim 2, wherein the carrier frequency is substantially equal to 100 kHz.
4. A device for attenuating the noise generated at the outlet (18) of an exhaust line (14), wherein it comprises:
 - means (34, 36) for defining a signal representing the noise to be attenuated,
 - means (32) for producing a low-frequency counter-noise signal (Δf_b), which is in opposition of phase to the signal representing the noise to be attenuated,
 - a first and a second transducer (22, 24) arranged in an attenuation zone (26) of the exhaust line (14), the first and second transducers (22, 24) being configured for generating interference between the sound waves that are produced and present in the attenuation zone (26),

- means (30) for controlling the first transducer (22) for emitting a first high-frequency sound wave (F1), which first high-frequency sound wave (F1) is inaudible and has a carrier frequency of higher than 50 kHz, and
- means (30, 32, 38) for controlling the second transducer (24) for emitting a second high-frequency sound wave, which second high-frequency sound wave ($F1 + \Delta f_{cb}$) is inaudible and has as its carrier frequency the carrier frequency of the first high-frequency sound wave (F1) and contains the low-frequency counter-noise signal (Δf_b), which is in opposition of phase to the signal representing the noise to be attenuated.

5. The device as claimed in claim 4, wherein the first and second transducers are piezoelectric transducers.

6. The device as claimed in claim 5, wherein said piezoelectric transducers are lead zirconate titanate-based.

7. The device as claimed in any one of claims 4 to 6, wherein said means for defining a noise signal comprise a microphone (36) for recording the residual noise ($\Delta \epsilon$) at the outlet of the exhaust line (12).

8. The device as claimed in any one of claims 4 to 6, wherein said means for defining a noise signal comprise a unit (32) for monitoring the ignition frequency of the engine.

9. An installation for powering a motor vehicle, wherein it comprises a heat engine (12), an exhaust line (14) and a noise attenuation device (20) as claimed in any one of claims 4 to 8, the first and second transducers (22, 24) being arranged on the exhaust line (14).